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Abstract

LABORATORY AND PILOT PLANT TESTS ON THE PRODUCTION OF AMMONIUM URANOUS FLUORIDE AS AN INTERMEDIATE IN REFINING OPERATIONS

by

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Ammonium uranous fluoride (UF_4NH_4F) was precipitated from a solution containing uranyl nitrate ($UO_2(NO_3)_2$), ammonium fluoride (NH_4F) and formic acid (HCOOH) by the introduction of sulphur dioxide (SO_2). Laboratory tests showed that at elevated temperatures the rate of precipitation of the UF_4NH_4F was constant and largely dependent on the initial HCOOH concentration. The constant driving force during the reaction was attributed to the continuous regeneration of an active reducing agent and a reaction mechanism based on the generation in a formic acid-formaldehyde sulphoxylate system was proposed. The practical advantages of reducing reagent costs by re-using the regenerated reducing agent were demonstrated.

Pilot plant tests showed that it was possible to produce a product of nuclear grade purity after having overcome severe corrosion problems. It is considered that the present relatively high reagent cost of $0.84 per Kg.U could be reduced to $0.31 per Kg. U on a larger scale of operation.